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EVALUATION OF ON-LINE MILITARY PARTS CONTROL INFORMATION SYSTEM PROTOTYPE

Report DL705R1

March 1989

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Prepared pursuant to Department of Defense Contract MDA903-85-C-0139. The views expressed here are those of the Logistics Management Institute at the time of issue but not necessarily those of the Department of Defense.

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REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION / AVAILABILITY OF REPORT "A" Approved for public release; distribution unlimited.
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) LMI-DL705R1	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Logistics Management Institute 6b. OFFICE SYMBOL *(If applicable)*	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS *(City, State, and ZIP Code)* 6400 Goldsboro Road Bethesda, Maryland 20817-5886	7b. ADDRESS *(City, State, and ZIP Code)*
8a. NAME OF FUNDING / SPONSORING ORGANIZATION DLA Technical and Logistics Services 8b. OFFICE SYMBOL *(if applicable)* DLA-S	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER MDA903-85-C-0139
8c. ADDRESS *(City, State, and ZIP Code)* Room 5D530 Cameron Station Alexandria, VA 22314	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. / WORK UNIT ACCESSION NO.
11. TITLE *(Include Security Classification)* Evaluation of On-Line Military Parts Control Information System Prototype	
12. PERSONAL AUTHOR(S) Walter P. Hamilton, III	
13a. TYPE OF REPORT Final 13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT *(Year, Month, Day)* March 1989 15. PAGE COUNT 38
16. SUPPLEMENTARY NOTATION	

17. COSATI CODES			18. SUBJECT TERMS *(Continue on reverse if necessary and identify by block number)*
FIELD	GROUP	SUB-GROUP	CALS, parts control, GFB – Government Furnished Baseline, PPSL – Proposed Parts Selection List

19. ABSTRACT *(Continue on reverse if necessary and identify by block number)*

One of the Department of Defense's responsibilities is to procure spare parts efficiently. The Defense Logistics Agency (DLA) Parts Control Program helps achieve that objective by keeping track of known reliable parts and categorizing them into the proper Government Furnished Baselines (GFBs). Contractors and engineers use this information to determine the most suitable parts for use in weapon systems development. The MPIS demonstrates how an interactive environment can simplify access to the GFB information. It also focuses attention on the cost of updating the GFBs and the potential for improving the accuracy of the GFB data.

We recommend that DLA incorporate benefits demonstrated in the prototype MPIS into the Modernized Parts Control Automated Support System (MPCASS). Including the MPIS capabilities in MPCASS will take advantage of the lessons learned during MPIS development and testing. We learned that users preferred having interactive access to data to current methods of obtaining data (through the mail). We found it feasible for contractors to interactively select data and download them to their local computer systems. DLA can maximize the ability of contractors to select the proper spare parts quickly and accurately by adapting these measures and others outlined in this report.

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION
22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE *(Include Area Code)* / 22c. OFFICE SYMBOL

LMI

Executive Summary

EVALUATION OF ON-LINE MILITARY PARTS CONTROL INFORMATION SYSTEM PROTOTYPE

One of the Department of Defense's responsibilities is to procure spare parts efficiently. The Defense Logistics Agency (DLA) Parts Control Program helps achieve that objective by keeping track of known reliable parts and categorizing them into the proper Government Furnished Baselines (GFBs). Contractors and engineers use this information to determine the most suitable parts for use in weapon systems development. The MPIS demonstrates how an interactive environment can simplify access to the GFB information. It also focuses attention on the cost of updating the GFBs and the potential for improving the accuracy of the GFB data.

We recommend that DLA incorporate benefits demonstrated in the prototype MPIS into the Modernized Parts Control Automated Support System (MPCASS). Including the MPIS capabilities in MPCASS will take advantage of the lessons learned during MPIS development and testing. We learned that users preferred having interactive access to data to current methods of obtaining data (through the mail). We found it feasible for contractors to interactively select data and download them to their local computer systems. DLA can maximize the ability of contractors to select the proper spare parts quickly and accurately by adapting these measures and others outlined in this report.

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CHAPTER 1

INTRODUCTION

The Defense Logistics Agency (DLA) Military Parts Control Advisory Group (MPCAG) is responsible for managing the Parts Control Program which promotes the use of standard parts by Defense contractors. The Defense Industrial Supply Center (DISC) and Defense Electronics Supply Center (DESC) maintain databases containing data related to these parts using "Government Furnished Baselines" (GFBs). The GFBs provide contractors with a listing of preferred standard parts. DISC maintains baselines for mechanical parts; DESC maintains baselines for electrical/electronic parts. DESC also maintains the related DESC Drawing List (DDL) 103, Military Bulletin (MIL-BUL)-103, and Specifications and Drawings In Progress (SD/IP) data. Currently, DISC and DESC provide these data to contractors and the military on magnetic tape or by printed output.

DLA also is participating in the DoD Computer-aided Acquisition and Logistic Support (CALS) initiative, which promotes the DoD/industry exchange of digital technical information for weapon system acquisition, design, manufacture, and support. With CALS technology, accurate and timely data can be provided using interactive access to a parts database replacing the cumbersome methods currently used to support the Parts Control Program baselines. As a CALS demonstration project, DLA tasked the Logistics Management Institute (LMI) to design a prototype on-line parts control management information system. The prototype MPCAG Part Information System (MPIS) allows the military and contractors to access, view, and download MPCAG part data. This interactive prototype, implemented in June 1988, has been tested by DESC, DISC, and approximately 60 contractors. The user community consisted of large and small geographically dispersed organizations. (See Figure A-1.) The overall goal of the MPIS is to determine the most efficient way to provide parts control management data to contractors and the military.

GFBs are maintained on the DESC/DISC mainframe systems with batch interface via the IV Phase computers. On-line access to these data are not available. Data are delivered to the Military Services and DoD contractors in hard-copy (paper) format or magnetic tape. Approximately 1,000 hard-copy requests are filled each

year. The GFB file update process is cumbersome, expensive, and ineffective. It requires many technicians and engineers to review, edit, and enter information into the computer system. An update usually takes 9 to 12 months. In addition, generating magnetic tapes and producing hard-copy reports are time-consuming and expensive. The MPIS prototype allows DLA to assess the benefits and pitfalls of using an interactive system as a potential replacement for these old batch operations.

This report describes the prototype MPIS, its features, and our evaluation of these features based on comments received from contractors and other users of the MPIS. Appendix A contains the names and organizations of MPIS users.

CHAPTER 2

SYSTEM SUMMARY

2.1 MPIS COMPUTER CONFIGURATION

MPIS allows Service representatives and contractors to access, view, and download MPCAG data. Data are viewed interactively and downloaded in standard ASCII (American Standard Code for Information Interchange) format. Users have the option of storing data in the same format or converting it to a format compatible with other internal systems. The MPIS helps accelerate the transition from a paper-intensive process to an interactive automated process. The MPIS is installed at the Defense Technical Information Center Special Projects Office (DTIC-SPO), formerly known as the Defense Applied Information Technology Center (DAITC), in Alexandria, Va.

The MPIS requires the following hardware, software, and communications at the host (see Figure 2-1):

- Pyramid 98x computer with UNIX (Berkeley 4.3) as its operating system.
- Ingres relational database management system and "C" programming language.
- Tymnet communications connection. The Pyramid dedicates four Tymnet communications ports (1200/2400 baud lines) to MPIS processing.
- Data communications software, allowing file downloading by local systems.

Users require the following hardware and software at their remote sites:

- Personal computer (PC) with software to emulate a VT100 terminal, or a VT100 terminal.
- Modem and telephone line allowing dial-up communications at 1200 or 2400 baud.
- Z-Stem, Xtalk, or other PC data communications software for access to the Pyramid. File downloading requires support of the Kermit protocol.

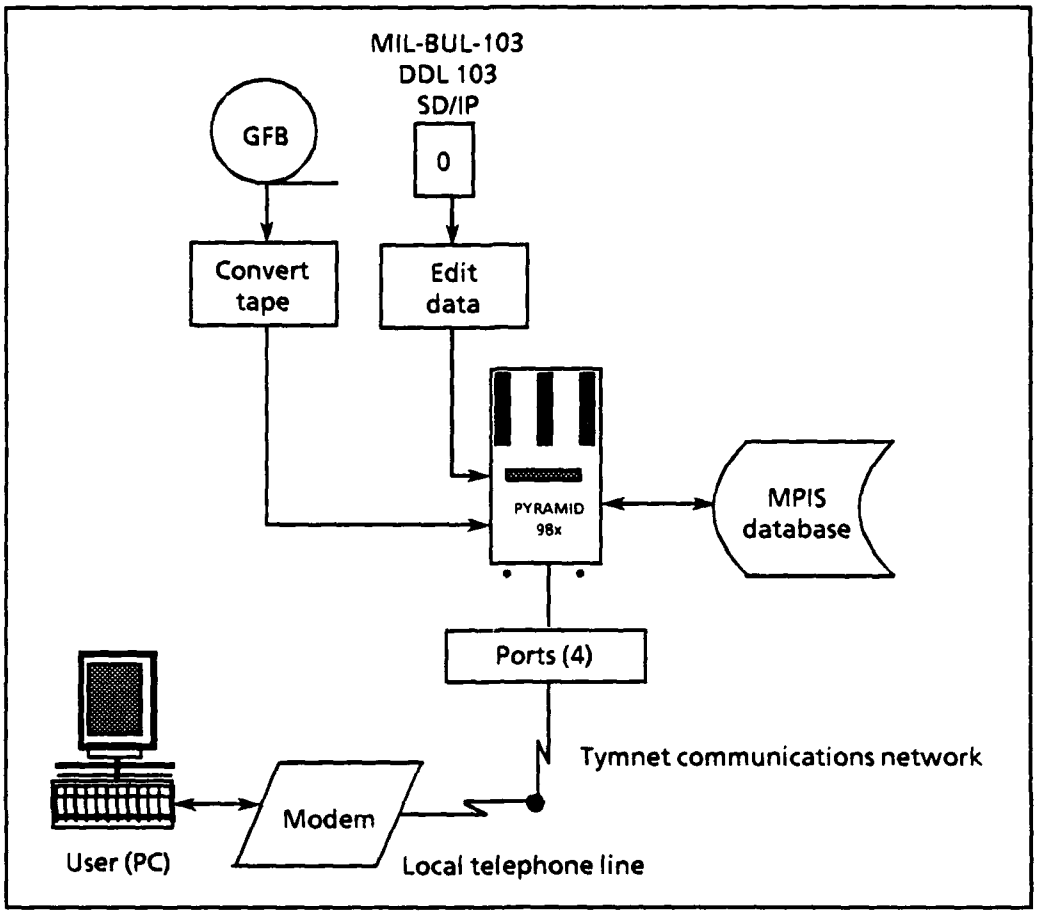


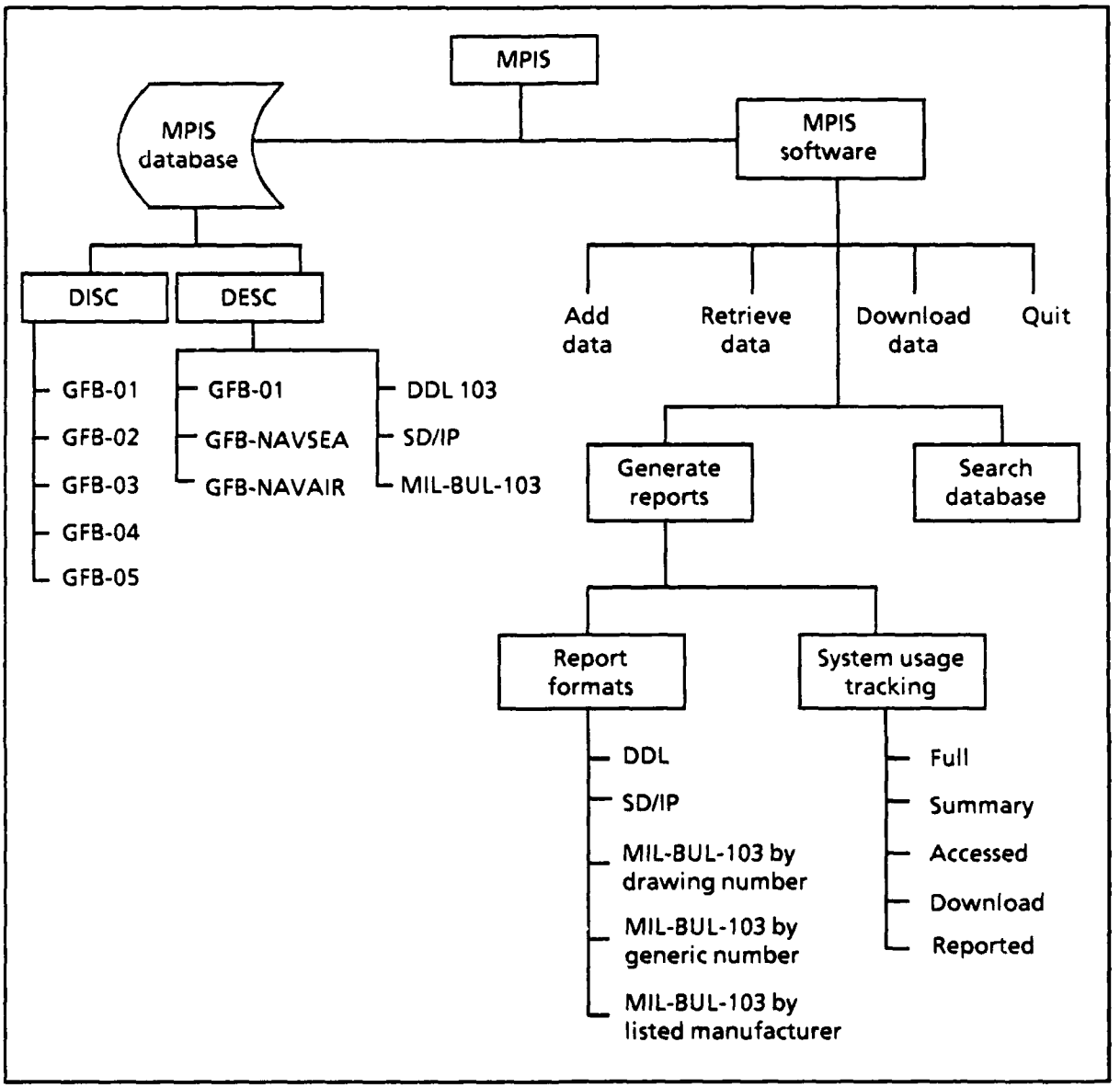
FIG. 2-1. MPIS HARDWARE

2.2 MPIS DATA

Tables containing the GFB, SD/IP, DDL 103, and MIL-BUL-103 data make up the database. (See Figure 2-2.) The data types are described below.

The five mechanical parts (DISC) GFBs are

- GFB-01 – Mechanical parts for use in new design of airborne and ground electrical/electronic equipment
- GFB-02 – Mechanical parts for use in new design or modification of aircraft systems



Note: NAVSEA = Naval Sea Systems Command; NAVAIR = Naval Air Systems Command.

FIG. 2-2. MPIS DATA AND SOFTWARE

- GFB-03 – Mechanical parts for use in design of aircraft simulators and training devices
- GFB-04 – Mechanical parts for use in design of new or modified guided missile systems
- GFB-05 – Mechanical parts for use on aircraft engines.

The three electrical/electronic part (DESC) GFBs are

- GFB-01 – Electrical/electronic parts list for Air Force and general use
- GFB-NAVSEA[1] – Electrical/electronic parts list for Navy ships
- GFB-NAVAIR[2] – Electrical/electronic parts list for Navy aviation.

Other DESC files are

- SD/IP for microcircuits, which includes new specifications and drawings and those revisions that add new device types for Federal Supply Class (FSC) 5962 parts
- DDL 103, which provides a tabulation of DESC drawings and provides guidelines and procedures for the initiation and preparation of such drawings
- MIL-BUL-103, which consists of standardized military drawings, microcircuit data, and sources for FSC 5962.

Data must be preprocessed before it is entered into the MPIS database (refer to Figure 2-1). DLA provides the GFBs on 9-track magnetic tape in the EBCDIC (Extended Binary Coded Decimal Interchange Code) format. These data must be converted to ASCII format. The MIL-BUL-103, SD/IP, and DDL 103 are received on floppy disc, having been produced on a PC-based system in ASCII format. These files do not need converting, but must be edited to insert field separators and end-of-line characters.

2.3 DATA RETRIEVAL AND DOWNLOADING

The MPIS is a screen-based system allowing users to move easily through the database. A menu line on each screen displays the available options, allowing users to decide what they want to see or do.

MPIS users can view either DISC or DESC data. Users may search for an individual part, a group of parts within an FSC, an entire FSC, or a group of related parts. The MPIS supports Boolean operations and partial pattern matching.

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[1]Naval Sea Systems Command.

[2]Naval Air Systems Command.

To assist in viewing retrieved data, the MPIS displays the number of records in the group that can be retrieved (e.g., record 1 of 87 records retrieved). This feature is useful to refine search criteria.

In addition to viewing data by using screens, MPIS users may query and view DESC data in any of several report formats. That is, MPIS replicates some existing hard-copy reports on-line; MPIS, however, has no hard-copy report generating or distributing capability. The following DESC reports are available for review on-line:

- DESC Drawing List 103 (DDL 103)
- Specifications and Drawings in Progress
- MIL-BUL-103; Appendix Section 1; Integrated Circuits Part I, Listed by Drawing Number
- MIL-BUL-103; Appendix Section 1; Integrated Circuits Part II, Listed by Generic Number
- MIL-BUL-103; Appendix Section 1; Integrated Circuits Part III, Listed by Manufacturer.

The downloading capability allows users to transfer data selected from the MPIS to their PCs. Only data retrieved during a query can be downloaded. At transmission time, the system determines the file size and line speed, converts retrieved data to an ASCII formatted file, and calculates the file transmission time. File transmission time is limited to 15 minutes for the prototype. Users are able to use downloaded files at their PCs for further processing.

2.4 SYSTEM USAGE REPORTING

Another reporting capability allows users (designated by the project manager) to monitor system usage. This report provides information on log-in time, log-out time, tables accessed, and the volume of data downloaded for each user. This information is available in the following formats:

- *Full.* Displays full details of usage. When this option is selected, the report displays elapsed time, tables accessed, records retrieved, records actually viewed, downloads accomplished, records downloaded, and the number of bytes downloaded. This information is maintained by user name and session identification number.

- *Summary.* Summarizes each session. The summary displays log-in time, tables accessed, number of records selected, and the number of records viewed.

- *Accessed.* Displays statistics on tables accessed, including log-in time, table name, records selected, and records actually viewed.

- *Downloaded.* Displays statistics on data downloaded. MPIS captures log-in time, table name, records downloaded, and number of bytes downloaded.

- *Reported.* Displays statistics on reports reviewed, including log-in time, report requested, number of records selected, and number of records viewed.

2.5 SECURITY AND ACCESS

The MPIS contains only unclassified data; however, the system provides security to protect the integrity of its data. The MPIS provides security at several levels: Tymnet log-in, MPIS log-in, database, and at the data element. For example, contract code is a protected data element; it cannot be accessed. Users of MPIS are required to have a user identification and a password for both Tymnet and MPIS. The MPIS allows updating, appending, and deleting of data by authorized users. Most users have only retrieve (search) privileges.

Using Tymnet allows user access to MPIS from more than 750 cities in the United States at no expense to them. The use of Tymnet also simplified the development and implementation of downloading logic since the downloading software need monitor only Tymnet lines, not all telephone lines entering the data center.

2.6 USER COMMUNITY

Approximately 600 potential users of MPIS from DLA, contractors, Defense Department, and other Government agencies exist. Because of prototype hardware and software limitations, we had to select a smaller user base to conduct the test. To ensure fairness in our selection, we surveyed the contractors and some Government agencies to seek volunteers to participate in the prototype evaluation; 64 contractors agreed to help evaluate the MPIS (see Appendix A). We asked them to evaluate the interactive MPIS as a potential new way to access GFB part data. In addition to the 64 contractor organizations, DLA, DISC, DESC, Defense General Supply Center (DGSC), Defense Construction Supply Center (DCSC), and DLA Systems Automation Center (DSAC) also had access to the system. DLA, DISC, and DESC

used the system from a management perspective, monitoring contractor participation and overall system usefulness. The Military Services used the MPIS to monitor weapon systems' development using piece parts defined in the MPIS. The DSAC evaluated the system from a technical point of view, because they are interested in incorporating some MPIS features into the Modernized Parts Control Automated Support System (MPCASS) now under development. Features to be incorporated will be determined by DLA, user responses, and system evaluation results.

CHAPTER 3

USER FEEDBACK

Users participating in the MPIS evaluation responded on the Comments Log. Of the 64 users queried, 19 organizations responded. While response rate was less than desired, the comments of the users are helpful in determining the utility of the MPIS.

The remainder of this chapter discusses the 17 questions on the Comments Log and the users' answers. We summarized the participants' answers and used them to determine the features that we believe should be incorporated in the MPCASS currently under development.

Question 1 – How many hours do you work on a computer terminal weekly?

Response – (This question was asked to assess the level of computer sophistication in the user population.) The responses averaged 21 hours a week, which is reassuring.

Question 2 – Do you find that the log-in procedures to MPIS are straightforward and easy to use? Please provide comments and recommendations.

Response – Three-quarters of the respondents found the log-in procedures to be straightforward and easy. Two of those who did not also failed to answer Question 1. This suggests that they may be novice users.

One complaint was lodged against the case sensitive password; this is an access security feature standard for data protection throughout DoD. Another comment noted the requirement to enter two sets of log-on IDs and passwords. The first log-on/password is required for Tymnet, the second for MPIS.

Question 3 – Do you have any problems downloading data to your PC? If you have, please describe.

Response – Almost half of the respondents reported problems with downloading. Most of their problems were related to the communications network

and not the system; others were with the communications software. Specifically, ProComm users were unsuccessful in their attempts to use the Kermit downloading option. We have reported this to the developers of ProComm. Also, the Enable communications software did not provide a workable emulation of a VT100 terminal.

Multiple downloads from the same database table caused problems because of the way MPIS creates file names. Each user is assigned an ID number when logging on. MPIS uses this ID number and part of the table name to create a name for the downloaded file (for example gfbgaf.045). Because MPIS uses this same file name for the entire log-in session, the system will write over the last file when the user performs multiple downloads from the same file. This problem does not occur if the users' communications software allows renaming of downloaded files.

When using multiple downloads to circumvent the prototype's 15-minute restriction on downloading, logging off MPIS and then getting on again between downloads would create unique file names for the table segments and would prevent writeovers.

A second method to circumvent this problem is to return to your local PC and change to another directory between downloads from the same table. This method put each table segment in a different directory. Multiple segments can be merged after the MPIS session.

Question 4 – Do you find the commands and menus to be straightforward and easy to use?

Response – We received 79 percent "yes" answers and 16 percent "no." Based on user response, most feel that the MPIS is straightforward and easy to use. Those who did not may need additional assistance.

Question 5 – What type of data format do you use in your database programming (e.g., ASCII, DBF, and WRK)?

Response – [This question determines if the downloaded data is in a format compatible with the user's local system (PC-based, minicomputer, or mainframe).] We received the following comments:

- Fifty-three percent of the respondents use the ASCII data format.

- Sixteen percent use both ASCII and DBF (Data Base File) formats.
- Twenty-one percent use DBF data format.

The responses indicate that a majority of users were able to use data downloaded in ASCII format. Conversion utilities are available to convert ASCII to other formats.

Question 6 – How many hours do you spend each week on the GFBs?

Response – Average use was about 8.5 hours per week. Four respondents did not respond to this question, with several users reporting system use of 20 – 30 hours per week.

Question 7 – How many hours do you spend each week on MPIS?

Response – Sixty-three percent reported that they use the MPIS an average of 2.5 hours per week. This is on-line time only, not time spent at their PCs post-processing downloaded data.

Question 8 – Do you think the MPIS saves time in your work? What percentage?

Response – The respondents split evenly on this question, with half reporting that MPIS saved time and the other half saying it did not.

The negative reactions reflected a variety of reasons for dissatisfaction. One common reason was being new to the use of a PC, particularly for downloading data from another computer. Since most users were designers or engineers, not computer programmers or analysts, tasks such as selecting communications parameters or editing downloaded data and loading them into a PC database were often unfamiliar, if not intimidating. As the user population becomes more comfortable with PCs, and learns where to seek technical advice when needed, we think the percentage of users perceiving MPIS-type capabilities as a timesaver must increase.

Question 9 – Have you bought any equipment for the purpose of the MPIS program?

Response – Most organizations apparently have the type of equipment needed to use the MPIS because 79 percent answered "no." Those who answered "yes" purchased PCs and modems or communications software.

Question 10 – What benefits, if any, are derived from the use of MPIS?

Response – The respondents listed these benefits:

- Good supplement to the GFB hard copy
- Ability to access data quickly
- Access to current data
- Allows access to MIL-BUL-103 data
- Provides generic part numbers
- Allows selective download of parts information
- None at this time (16 percent).

Question 11 – Would you prefer the MPIS or the traditional GFB for data information? Why?

Response – The responses fell into three categories:

- Forty-one percent said they prefer the MPIS. Their reasons range from speed and accuracy to easy access.
- An additional 24 percent wanted to have both available, reasoning that the two formats complement each other. One user noted that the hard-copy list would serve as a backup if the on-line system was not available.
- Thirty-five percent of the respondents indicated they prefer the traditional way of doing business, for the following reasons:
  - Not enough people were trained and motivated.
  - It is easier to skim a hard-copy page, read the description, and look for a generic part type. They would probably use the MPIS if a generic search capability was added.
  - Because it is faster.

Question 12 – When you need GFB information, how soon do you want it? Please indicate the time (minutes, hours, days, weeks).

Response – The responses ranged from minutes to weeks. (Eighty-one percent want their data in less than 8 hours.)

Question 13 – How important is it for you to obtain accurate GFB data in a timely manner?

Response – Most respondents feel it is critical or very important to have accurate, timely data.

Question 14 – Do you think the GFBs should be updated more frequently than now? How often have you delayed your project because of errors on the GFBs?

Response – More frequent updates of the GFBs were urged by 53 percent of the respondents. The recommended update cycle varied from real-time on-line to as required. Most respondents reported they have found no errors in the GFBs and delays were described as infrequent.

Question 15 – Do you think the MPIS will reduce the error on your Program Parts Selection List (PPSL) of the parts control program because you can directly use data captured from the network?

Response – A strong majority (89 percent) of the respondents said "yes" and provided the following comments:

- "Yes, if the system is made more usable."
- "Absolutely, we plan on creating a master PPSL database and matching all parts used in system design against it."
- "Yes, it would eliminate the guesswork for contractors to determine the history of current information on any given part."
- "I believe it will greatly reduce the error rate since fewer people will be transposing data by hand."

Question 16 – Do you think the MPIS saves time in your work? What percentage, if any?

Response – The respondents were almost evenly divided on this question: 32 percent said the MPIS saves an average of 16 percent of their time; 37 percent felt the system did not save any time.

Question 17 – Do you think the MPIS will reduce paperwork since data information is on the computer network?

Response – Seventy-four percent of the respondents said "yes" that they think the MPIS would reduce paperwork. Some users provided additional comments:

- "Yes, by having real-time access to a living database unneeded paperwork can be avoided."
- "Yes, keeping MIL-BUL-103 is essential for our heavy use of this system. The paperwork we have to maintain to keep MIL-BUL-103 current would be eliminated."
- "No, we need contractor-specific PPSL data."

CHAPTER 4

PROTOTYPE MPIS EVALUATION

The prototype was operational for the 6 months from June 1988 to December 1988 and was used by 64 people. Skill levels were very different: some had never used interactive systems and some had never transferred data from a host to a local system. These differences became clear when they tried to log into and use the system. Users were most comfortable with features common to the systems they had used before. Most did not want to just browse; they logged into the MPIS to acquaint themselves with its features and to retrieve information. All felt that it was helpful to have current data in an interactive mode. Because users were able to access a commercial communications network available to more than 750 cities, proximity to the MPIS host was not a concern. Based on verbal and written user comments and our own experience, the prototype MPIS demonstrated substantial benefits. It also exhibited some deficiencies that should be evaluated, if not rectified, in a production system.

4.1 SYSTEM BENEFITS

The prototype MPIS provided the following benefits:

- MPIS provided mechanical and electrical/electronic data in an interactive mode allowing quick access to current data. Users were able to query data selectively, reducing the need for large hard-copy reports. It is clearly a savings to DLA if they can reduce the requirement to produce and distribute the hard-copy reports.

- MPIS allowed contractors to download data, updating their local databases interactively with data from the host. In the pre-prototype configuration, only contractors who went to the trouble to copy these files from DLA-provided 9-track tapes had automated access to the data. The downloading capability of the prototype provides an alternative that is simpler and less expensive. The possibility of accessing these data without owning a tape drive should considerably broaden the market for this service among contractors. It is also to DLA's advantage if they can reduce or eliminate the requirement to provide parts data on tape.

- MPIS guaranteed a higher degree of data accuracy. With current data on-line, users without 9-track tape facilities can receive all or portions of the

data they need electronically. Users do not have to copy information from listings, which induces transcription errors.

- One-half of the respondents reported that the MPIS saved them time over traditional methods. With an estimated potential user base of 600, this represents a considerable improvement in productivity. Additionally, the percentage of users realizing a time-savings could be increased by addressing some of the deficiencies/refinements discussed in the following section.

- Eighty-nine percent of respondents reported that the MPIS reduced the errors on the PPSL aspect of the Parts Control Program. Prime contractors must develop a PPSL of approved parts for each contract. By downloading DLA data directly to their own computers, contractors can construct their PPSLs more easily and accurately than by transcribing from printed listings. Errors in the PPSL are particularly troublesome because, if not found and corrected, they can be picked up by subcontractors and further propagated.

4.2 SYSTEM DEFICIENCIES AND REFINEMENTS

Prototype testing by Government and contractor personnel revealed that the following areas could be improved if MPIS-like capabilities are incorporated in a production system:

- Database tables and attributes need to be analyzed to see if design improvements are feasible. The current design apparently results in performance degradation when there are more than five simultaneous users.

- A data dictionary would be a useful addition. It should include the name, description, size, and permissible values of each data element. Having on-line access to this information would make the system less imposing to novice users.

- Ease of retrieval could be improved by adding a multiple-record per screen capability to the existing one-part per screen. If query responses were presented as a list of qualifying records, users could then select from that list to get details about a part.

- The use of "End" and "Quit" on the menu line was confusing. Choosing "End" means that processing on the current screen will stop. Choosing "Quit" ends the current log-in session (although it does require confirmation before disconnecting from the MPIS). Although this procedure is consistent with the users manual, resolving the ambiguity should require only minor coding revision.

- The procedure required to exit a function is unsatisfactory. To exit a function, the user must invoke each screen in reverse order. The "End" option must be selected for each screen until the main menu appears. At that point, the user can change functions. Sometimes the user must pass through three or four screens on the way to the main menu. Eliminating this time-consuming process by allowing an immediate return to the main menu is highly recommended.

- Kermit downloading protocol is not, by itself, sufficient. Kermit was used for the prototype because the developmental Pyramid computer system requires it. In an operational environment, it would be better to support at least two protocols to make downloading accessible to more users. At a minimum, XMODEM protocol should also be available.

- The 15 minutes allowed for downloading during the prototype is probably too short for regular operation. Appendix B, "Federal Supply Class Downloading Times," lists several important data areas that require longer than 15 minutes to download. MPCASS personnel should evaluate transmission times to set a more realistic upper limit for production use. Thirty minutes may be appropriate; that would exceed any of the downloading times listed in Appendix B.

- In certain circumstances, MPIS would assign duplicate file names to multiple downloaded files, effectively overwriting all but the last. Although there are ways the user can avoid this problem, the system itself should use a more intelligent method for assigning file names.

- Users reported difficulty with two particular communications packages, Enable and ProComm. More specifically, Enable exhibited problems in emulating a VT100 terminal, and ProComm was unable to provide a file download capability using Kermit protocol.

- Users need more education. Many users encountered difficulties using the PC interactively because of insufficient knowledge of communications software, including the proper settings for communications parameters. New users would benefit greatly if a technical person was available to help install and set up the system.

- Most users did not access the available reporting functions. The specific reporting needs of potential MPIS users should be re-evaluated to determine if they have requirements for information beyond that available interactively via the screen formats.

  Statistical reports (for system administration) take too long to run. This feature should be examined to see if there are ways to make it run faster. Alternatively, the system designers may be able to decrease the processing overhead by eliminating or simplifying some of these reports.

- Automated procedures are needed to process the data submitted for entry into the system. All GFB 9-track file inputs must be converted to ASCII, inserting the proper control characters. MIL-BUL-103, DDL 103, and SD/IP files are on floppy disk; their data elements had to be manually reformatted to conform to MPIS specifications. These procedures, which are time-consuming and cumbersome, may have been manageable for the prototype, but would need to be reorganized and automated in a production implementation. When updating small amounts of data, the on-line updating capability should be used.

CHAPTER 5

RECOMMENDATIONS

The MPIS prototype provided an opportunity to demonstrate that contractors and DLA could benefit from an automated system allowing interactive access to standard parts data. Our evaluation of the results notes that the most significant benefits of the MPIS environment over the previous hard-copy reports and magnetic tape process are

1. *Easier access* to *more current* data
2. *More accurate* data, since transcription errors are eliminated
3. *Improved PPSLs* as a side effect of downloading and incorporating DLA data
4. The potential *savings* to DLA if the need for hard-copy reports or magnetic tapes can be reduced.

To achieve these benefits, we recommend that DLA incorporate the primary capabilities of MPIS (on-line access to parts data, with downloading to the user's site if desired) in future production systems, such as MPCASS. To maximize user acceptance and use, we also recommend that the following features be included during development of such a system:

- *Multiple record display.* The ability to view several records at a time on a terminal screen would allow users to see general information about several records before reviewing detailed information about selected records.
- *Downloading capability.* The ability to send digital technical data from the host system to the calling computer system, called downloading, is one of the most important features in the MPIS. For the prototype, Kermit was used as the download protocol. In a production situation, other download protocols should be available, allowing users more flexibility in their choice of communications programs. The XMODEM protocol, at the least, should be supported, as it is available in virtually all PC communications packages.
- *Record count display.* This option shows the number of records retrieved. It allows users to determine if they should refine their query in order to

retrieve a smaller (or larger) number of records. This is very useful considering the time limit on downloading data.

- *Alternative parts data.* The ability to view DESC MIL-BUL-103 data was appreciated by several users. This capability is useful for determining the sources of supply and generic replacement part numbers.

- *Statistical reporting.* The statistical reporting feature of the MPIS allows MPIS managers to monitor system usage. This capability must be examined closely, since an inefficient system design can produce unacceptable processing delays.

- *Data dictionary.* A data dictionary would allow users to obtain information about a data element, including a description, size, data type (numeric, alpha, or alphanumeric), possible codes, range of values, and other helpful information. It would make browsing easier for the occasional user.

- *Improved menu navigation.* The system should provide the user a means to shortcut between menus: for backing out to the main menu without going back through intermediate menus, or to jump ahead and bypass screens.

- *Unique file names.* Change algorithm for assigning download file names so that duplicate names are not assigned.

- *Improved telecommunications support.* During the prototype phase, users had poor results trying to use both the ProComm and Enable telecommunications packages. Such problems should be investigated thoroughly and rectified if possible. PC Plus (a version of ProComm), in particular, is often rated as the best PC telecommunications program now available. Treating it as unusable would be a mistake.

- *Hard-copy supplements.* It may be necessary to augment on-line data with hard-copy listings until users become comfortable with the system. Twenty-four percent of survey respondents asked that the on-line system be supplemented by hard-copy printouts.

GLOSSARY

ASCII	=	American Standard Code for Information Interchange
CALS	=	Computer-aided Acquisition and Logistic Support
DAITC	=	Defense Applied Information Technology Center
DBF	=	Data Base File
DCSC	=	Defense Construction Supply Center
DDL	=	DESC Drawing List
DESC	=	Defense Electronics Supply Center
DGSC	=	Defense General Supply Center
DIF	=	Data Interchange Format
DISC	=	Defense Industrial Supply Center
DLA	=	Defense Logistics Agency
DSAC	=	DLA Systems Automation Center
DTIC-SPO	=	Defense Technical Information Center Special Projects Office
EBCDIC	=	Extended Binary Coded Decimal Interchange Code
FSC	=	Federal Supply Class
GFB	=	Government Furnished Baseline
LMI	=	Logistics Management Institute
MIL-BUL	=	Military Bulletin
MPCAG	=	Military Parts Control Advisory Group
MPCASS	=	Modernized Parts Control Automated Support System
MPIS	=	MPCAG Part Information System
PC	=	personal computer
PPSL	=	Program Parts Selection List
SD/IP	=	Specifications and Drawings In Progress

APPENDIX A

PROTOTYPE USERS

This appendix names the organizations participating in the Military Parts Control Advisory Group (MPCAG) Part Information System (MPIS) prototype; their locations are shown in Figure A-1. Several categories of users volunteered to use and help evaluate this prototype. DoD contractors (Table A-1) are interested in locating standard parts for production of military systems. They are part of a group of about 550 who participate in the Parts Control Program. The Defense Logistics Agency (DLA) users are from the Defense Construction Supply Center, Defense Electronics Supply Center, Defense General Supply Center, and Defense Industrial Supply Center. The Military Services, the third category of users, include the Naval Underwater Systems Center, New London, Conn.; Ogden Air Logistics Center, Hill Air Force Base, Utah; and U.S. Army Research and Development Center, Fort Belvoir, Va. (Both DLA and military users are listed in Table A-2.)

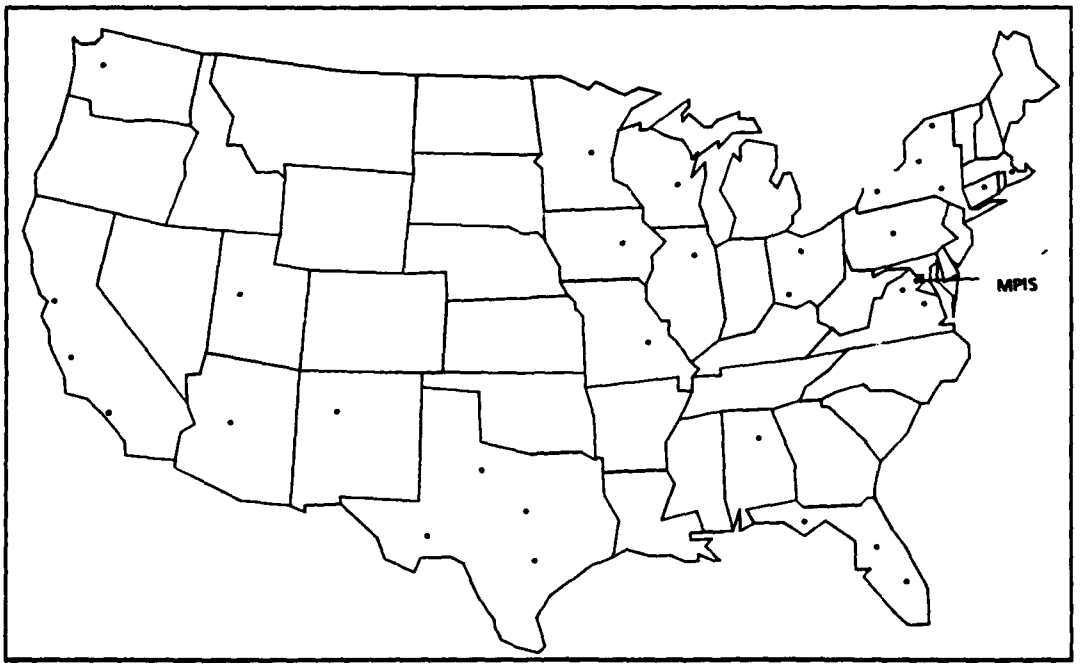

FIG A-1. LOCATION OF MPIS USERS

TABLE A–1

CONTRACTORS

Organization	Location
AAI Corporation	Hunt Valley, Md.
Allied Bendix	Teterboro, N.J.
Allied Bendix Aero	Baltimore, Md.
AUL Instruments, Inc.	Garden City, N.Y.
BDM Corporation	Albuquerque, N. Mex.
Bell Textron, Inc.	Fort Worth, Tex.
Boeing Aerospace Co.	Huntsville, Ala.
Boeing Aerospace Co.	Seattle, Wash.
Denro Lab	Gaithersburg, Md.
Eaton Corporation	Deer Park, N.Y.
Fairchild	Germantown, Md.
General Dynamics	Pomona, Calif.
General Dynamics	Fort Worth, Tex.
General Electric	Syracuse, N.Y.
General Instrument	Hicksville, N.Y.
Grumman Aircraft System	Bethpage, N.Y.
GTE Strategic Systems Division	Westborough, Mass.
Harris Corporation	Winter Park, Fla.
Hazeltine Corporation	Greenlawn, N.Y.
Hercules	Clearwater, Fla.
Honeywell, Inc.	Clearwater, Fla.
Honeywell, Inc.	Albuquerque, N. Mex.
Honeywell, Inc.	St. Louis Park, Minn.
Honeywell, Inc.	Everett, Wash.
Hughes	Fullerton, Calif.
IBM Corporation	Oswego, N.Y.
ITT	Clifton, N.J.
ITT Gilfillan	Van Nuys, Calif.
John Deere	Woodridge, N.J.
Kollsman	Merrimack, N.H.

TABLE A-1

CONTRACTORS (Continued)

Organization	Location
Lockheed Aircraft Co.	Ontario, Calif.
Loral Data	San Diego, Calif.
Loral Electronic System	Yonkers, N.Y.
Loral Systems Group	Littlefield Park, Ariz.
LTV Aerospace	Buffalo, N.Y.
Martin Marietta Aerospace	Orlando, Fla.
McDonnell Douglas	St. Louis, Mo.
Metric Systems Corporation	Ft. Walton Beach, Fla.
Motorola, Inc.	Scottsdale, Ariz.
NSM Corporation	Arlington, Va.
Oshkosh Truck Corporation	Oshkosh, Wis.
Quintron Corporation	Chantilly, Va.
Radian, Inc.	Alexandria, Va.
Raytheon	Sudbury, Mass.
Rockwell International	Anaheim, Calif.
Rockwell International	Cedar Rapids, Iowa
SAIC	San Diego, Calif.
Singer E Systems Division	Wayne, N.J.
Singer KG&N Division	Wayne, N.J.
Singer Link Division	Silver Spring, Md.
Sonicraft, Inc.	Chicago, Ill.
Sperry Marine, Inc.	Charlottesville, Va.
Texas Instruments	Dallas, Tex.
Texas Instruments	Plano, Tex.
Tracor Aerospace	Austin, Tex.
UNISYS Corporation	St. Paul, Minn.
VER-VAL Enterprises	Ft. Walton Beach, Fla.
VSE Corporation	Alexandria, Va.
Westinghouse Electric Co.	Madison, Wis.

TABLE A–2

MILITARY AND GOVERNMENT USERS

Organization	Location
Defense Construction Supply Center	Columbus, Ohio
Defense Electronics Supply Center	Dayton, Ohio
Defense General Supply Center	Richmond, Va.
Defense Industrial Supply Center	Philadelphia, Pa.
Naval Underwater Systems Center	New London, Conn.
Ogden Air Logistics Center	Hill Air Force Base, Utah
U.S. Army Research and Development Center	Fort Belvoir, Va.

APPENDIX B

FEDERAL SUPPLY CLASS DOWNLOADING TIMES

Appendix B contains the transmission times for each Federal Supply Class (FSC) within each Government Furnished Baseline (GFB). We show transmission times for 1200 and 2400 baud transfer rates. While these transmission times are generally accurate, different communications software and protocols may produce different results.

The format for this appendix is

FSC – The codes representing the various FSCs within a GFB.

Records – The number of part records retrieved for the specified FSC.

Download time – The time calculated to download parts records for a given FSC at the specified baud rate. Times are shown in minutes and seconds.

TABLE B-1

GOVERNMENT FURNISHED BASELINE

GFB-01 (General/Air Force)

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
5905	109	2 / 39	5 / 55
5910	465	11 / 22	25 / 15
5915	41	1 / 0	2 / 13
5920	12	/ 17	/ 39
5925	33	/ 48	1 / 47
5930	190	4 / 38	10 / 19
5935	224	5 / 28	12 / 10
5940	101	2 / 28	5 / 29
5945	37	/ 54	2 / 0
5950	94	2 / 17	5 / 6
5955	27	/ 39	1 / 28
5961	744	18 / 11	40 / 24
5962	1,021	24 / 57	55 / 27
5970	7	/ 10	/ 22
5999	21	/ 30	1 / 8
6135	13	/ 19	/ 42
6210	20	/ 29	1 / 5
6240	2	/ 2	/ 6
6645	3	/ 4	/ 9

TABLE B-2

GOVERNMENT FURNISHED BASELINE

GFB-NAVSEA

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
4140	9	/ 13	/ 29
5905	116	2 / 50	6 / 18
5910	325	7 / 56	17 / 39
5920	45	1 / 6	2 / 26
5925	87	2 / 7	4 / 43
5930	248	6 / 3	13 / 28
5935	459	11 / 13	24 / 56
5940	88	2 / 9	4 / 46
5945	312	7 / 37	16 / 56
5950	1,088	26 / 35	59 / 6
5955	44	1 / 4	2 / 23
5961	1,015	24 / 48	55 / 8
5962	924	22 / 35	50 / 11
5965	23	/ 33	1 / 14
5970	60	1 / 28	3 / 15
5990	27	/ 39	1 / 28
5999	57	1 / 23	3 / 5
6135	13	/ 19	/ 42
6145	23	/ 33	1 / 14
6240	26	/ 38	1 / 24
6625	15	/ 22	/ 48
6645	2	/ 2	/ 6

TABLE B-3

GOVERNMENT FURNISHED BASELINE

GFB-NAVAIR

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
5905	191	4 / 30	10 / 1
5910	461	10 / 53	24 / 11
5915	7	/ 9	/ 22
5920	13	/ 18	/ 40
5925	31	/ 43	1 / 37
5930	170	4 / 0	8 / 55
5935	243	5 / 44	12 / 45
5940	61	1 / 26	3 / 12
5945	22	/ 31	1 / 9
5955	27	/ 38	1 / 25
5961	692	16 / 20	36 / 18
5962	810	19 / 7	42 / 30
5970	8	/ 11	/ 25
5999	21	/ 29	1 / 6
6210	19	/ 26	/ 59
6240	2	/ 2	/ 6

TABLE B-4

GOVERNMENT FURNISHED BASELINE

GFB-01 (Mechanical Parts)

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
3110	20	/ 18	/ 40
3120	16	/ 14	/ 32
4720	1	/ 0	/ 1
4730	34	/ 31	1 / 9
5305	99	1 / 30	3 / 21
5306	21	/ 19	/ 42
5307	8	/ 7	/ 16
5310	154	2 / 21	5 / 13
5315	21	/ 19	/ 42
5320	28	/ 25	/ 57
5325	4	/ 3	/ 8
5330	6	/ 5	/ 12
5340	23	/ 21	/ 46
5355	27	/ 24	/ 5
5360	2	/ 1	/ 4
5365	2	/ 1	/ 4

TABLE B-5

GOVERNMENT FURNISHED BASELINE

GFB-02 (Mechanical Parts)

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
3020	3	/ 2	/ 6
3040	2	/ 1	/ 4
3110	51	/ 46	1 / 43
3120	48	/ 44	1 / 37
4010	15	/ 13	/ 30
4030	20	/ 18	/ 40
4710	7	/ 6	/ 14
4720	14	/ 12	/ 28
4730	237	3 / 37	8 / 2
5305	211	3 / 13	7 / 9
5306	285	4 / 21	9 / 40
5307	49	/ 44	1 / 39
5310	187	2 / 51	6 / 20
5315	38	/ 34	1 / 17
5320	72	1 / 6	2 / 26
5325	14	/ 12	/ 28
5330	59	/ 54	2 / 0
5340	140	2 / 8	4 / 45
5355	21	/ 19	/ 42
5360	2	/ 1	/ 4
5365	52	/ 47	1 / 45
9535	1	/ 0	/ 2
9540	1	/ 0	/ 2

TABLE B-6

GOVERNMENT FURNISHED BASELINE

GFB-03 (Mechanical Parts)

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
3020	2	/ 1	/ 3
3110	36	/ 36	1 / 10
3120	25	/ 21	/ 48
4030	11	/ 9	/ 21
4720	8	/ 7	/ 15
4730	115	1 / 40	3 / 43
5305	134	1 / 57	4 / 20
5306	41	/ 35	1 / 19
5307	6	/ 5	/ 11
5310	180	2 / 37	5 / 30
5315	32	/ 28	1 / 2
5320	33	/ 28	1 / 4
5325	14	/ 12	/ 27
5330	9	/ 7	/ 17
5340	60	/ 52	1 / 56
5355	22	/ 19	/ 42
5360	2	/ 1	/ 3
5365	9	/ 7	/ 17
9505	2	/ 1	/ 3

TABLE B-7

GOVERNMENT FURNISHED BASELINE

GFB-04 (Mechanical Parts)

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
3010	1	/ 0	/ 2
3110	33	/ 30	1 / 7
3120	19	/ 17	/ 39
4010	1	/ 0	/ 2
4030	3	/ 2	/ 6
4720	6	/ 5	/ 12
4730	88	1 / 21	3 / 0
5305	124	1 / 54	4 / 14
5306	32	/ 29	1 / 5
5307	8	/ 7	/ 16
5310	166	2 / 33	5 / 41
5315	32	/ 29	1 / 5
5320	45	/ 41	1 / 32
5325	12	/ 11	/ 24
5330	12	/ 11	/ 24
5340	65	1 / 0	2 / 13
5355	27	/ 24	/ 55
5360	2	/ 1	/ 4
5365	23	/ 21	/ 47
9535	1	/ 0	/ 2

TABLE B-8

GOVERNMENT FURNISHED BASELINE

GFB-05 (Mechanical Parts)

FSC	Records	Download time 2400 baud (min/sec)	Download time 1200 baud (min/sec)
3010	1	/ 0	/ 1
3020	3	/ 2	/ 5
3040	2	/ 1	/ 3
3110	57	/ 50	1 / 51
3120	50	/ 44	1 / 38
4010	16	/ 14	/ 31
4030	18	/ 15	/ 35
4710	7	/ 6	/ 13
4720	20	/ 17	/ 39
4730	288	4 / 14	9 / 25
5305	269	3 / 57	8 / 48
5306	386	5 / 40	12 / 37
5307	49	/ 43	1 / 36
5310	239	3 / 31	7 / 49
5315	52	/ 45	1 / 42
5320	93	1 / 22	3 / 2
5325	20	/ 17	/ 39
5330	79	1 / 9	2 / 35
5340	178	2 / 37	5 / 49
5355	28	/ 24	/ 54
5360	2	/ 1	/ 3
5365	44	/ 38	1 / 26
9505	2	/ 1	/ 3
9535	2	/ 1	/ 3
9540	1	/ 0	/ 1